

# DETECTING MARINE HEATWAVES IN THE BELGIAN PART OF THE NORTH SEA: EFFECTS ON PLANKTON BLOOMS AND DIVERSITY

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In marine ecosystems, plankton form the base of trophic webs and act as key players in biogeochemical fluxes such as the carbon cycle. Their foundational role in such systems make plankton highly valuable for monitoring and predicting abiotic effects on marine communities. In the Belgian part of the North Sea (BPNS), where the shallow waters are already subject to various anthropogenic influences, marine heatwaves associated with climate change have also started to affect plankton dynamics. In recent years, warmer summers in the BPNS have led to phenology changes including unprecedented blooms of *Bellerochea* sp., and temporary depletion of dominant groups such as copepods. The current study expands on such findings using a long-term time series from the Belgian contribution to LifeWatch. Plankton samples are collected monthly (nine coastal stations) and seasonally (with an additional eight offshore stations) on board the RV Simon Stevin, with zooplankton data from 2014 onwards and phytoplankton data from 2017 onwards. ZooScan and FlowCam imaging sensors were used to identify and quantify abundances of zooplankton and phytoplankton, respectively. These data were then used to determine dominant plankton groups and blooms. In parallel, marine heatwaves in the BPNS were detected using the Hobday method (Hobday, 2018). If the SST surpassed the 90<sup>th</sup> percentile seasonal climatology for at least 5 days, this was considered a marine heatwave. Between 2017-2023, heatwave events were detected in most years, particularly in the summer, with highest temperatures being reached in the summers of 2018 and 2022. Marine heatwave detection was optimised by comparing temperatures from NOAA satellite data versus underway data from the RV Simon Stevin. Temperatures were also analysed between different regions of the BPNS. Ultimately, the aim of this research was to highlight shifts in community dominance and bloom timing in relation to marine heatwave events. This investigation provides insight into the health of the broader BPNS ecosystem given the increase of extreme climate events. Future research will delve further into the effects of marine heatwaves on plankton using *in situ* continuous imaging data as well as laboratory tests of genetic heat stress responses.

Hobday, A.J., Oliver, E.C.J., Gupta, A.S., Benthuisen, J.A., Burrows, M.T., 2018. Categorizing and Naming Marine Heatwaves. *Oceanography* 31, 162–173. <https://doi.org/10.5670/oceanog.2018.205>

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